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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/080,396 | 02/22/2002 | Xizeng Shi | RR1724/2344P | 8328 |

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SAWYER LAW GROUP LLP
P O BOX 51418
PALO ALTO, CA 94303

EXAMINER

YOHA, CONNIE C

ART UNIT PAPER NUMBER

2818

DATE MAILED: 10/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/080,396

Applicant(s)

SHI ET AL.

Examiner

Connie c. Yoha

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11 and 12 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: _____

DETAILED ACTION

1. Information Disclosure Statement (IDS) filed on 2/22/02 was considered.
2. Claims 1-12 are presented for examination.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1-4 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Naji, Pat. No. 6055178.

With regard to claim 1, Naji discloses a magnetic memory cell comprising: a first magnetic tunneling junction (fig. 1, 11) including a first ferromagnetic layer (fig. 2, 31), a second ferromagnetic layer (fig. 2, 32) and a first insulating layer (fig. 2, 33) between the first ferromagnetic layer and the second ferromagnetic layer; a reference magnetic tunneling junction (fig. 1, 12) (col. 2, line 37-41) including a third ferromagnetic layer (fig. 2, 31), a fourth ferromagnetic layer (fig. 2, 32) and a second insulating layer (fig. 2, 33) between the third ferromagnetic layer and the fourth ferromagnetic layer; and means (fig. 1, 25) coupled with the first magnetic tunneling junction and the reference magnetic tunneling junction, for comparing a first output (fig. 1, V1) of the first magnetic tunneling junction with a reference output (fig. 1, V2) of the reference magnetic tunneling junction.

With regard to claim 2, Naji discloses wherein the comparing means further includes an operational amplifier having a first input and a second input, the first input being coupled with the first magnetic tunneling junction, the second input being coupled with the reference magnetic tunneling junction.

With regard to claim 3, Naji discloses a first current source (fig. 4, 68) coupled with the first magnetic tunneling junction (fig. 4, 41); and a second current source (fig. 4, 68) coupled with the reference magnetic tunneling junction (fig. 4, 70).

With regard to claim 4, Naji discloses at least one write circuit coupled with the first magnetic tunneling junction and the reference magnetic tunneling junction (col. 4, line 20-22).

Drafted as Method claim

As per claim 12, it encompasses the same scope of invention as to that of claim 1 except they draft in method format instead of apparatus format. The claim is therefore rejected for the same reason as set forth above.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 5-6 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Naji, Pat. No. 6111781.

With regard to claim 5, Naji discloses a plurality of magnetic tunneling junctions (fig. 1, 15-18) for storing data, each of the plurality of magnetic tunneling junctions including a first ferromagnetic layer (fig. 2, 71), a second ferromagnetic layer (fig. 2, 72) and a first insulating layer (fig. 2, 73) between the first ferromagnetic layer and the second ferromagnetic layer;

A reference magnetic tunneling junction (fig. 1, 19) (col. 2, line 66-67) including a third ferromagnetic layer (fig. 2, 71), a fourth ferromagnetic layer (fig. 2, 72) and a second insulating layer (fig. 2, 73) between the third ferromagnetic layer and the fourth ferromagnetic layer; and

Means (fig. 1, 46, 47) coupled with the plurality of magnetic tunneling junctions (fig. 1, 15-18) and the reference magnetic tunneling junction (fig. 1, 19), for comparing a plurality of outputs (fig. 1, 44 and 45) of the plurality of magnetic tunneling junctions with a reference output (fig. 53 or 54) of the reference magnetic tunneling junction.

With regard to claim 6, Naji discloses wherein the comparing means further includes a plurality of operational amplifiers (fig. 1, 46 and 47), each of the plurality of operational amplifiers having a first input (fig. 1, 44 or 54) and a second input (fig. 1, 53 or 54), the first input being coupled with a magnetic tunneling junction of the plurality of magnetic tunneling junctions (fig. 1, 15-18), the second input being coupled with the reference magnetic tunneling junction (fig. 1, 19).

With regard to claim 11, Naji discloses wherein the magnetic memory unit is part of a magnetic random access memory (Abstract) (col. 1, line 12-13).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naji, Pat. No. 6111781 in view of Naji, Pat. No. 6055178.

With regard to claim 7, Naji (6111781), as applied in prior rejection, disclosed all claimed subject matter except a plurality of current source, a current source of the plurality of current source coupled with a corresponding magnetic tunneling junction of the plurality of magnetic tunneling junctions, and with the reference magnetic tunneling junction. However, Naji (6055178) discloses a plurality of current source (fig. 4, 68, 69), a current source of the plurality of current source coupled with a corresponding magnetic tunneling junction of the plurality of magnetic tunneling junctions (fig. 4, 41, 42), and with the reference magnetic tunneling junction (fig. 4, 70) for driving a current through the magnetic tunneling junction and the reference magnetic tunneling junction. It is common knowledge that magnetic tunneling junction memory cells always required bit line current and word line current for read and write operation. Therefore, it is obvious for one having an ordinary skill in the art at the time the invention was made to incorporate the current source of Naji's (6055178) device into Naji's (6111781) for

supplying current to the magnetic junction and reference magnetic junction for reading and writing operation.

With regard to claim 8, Naji (6111781), as applied in prior rejection, disclosed all claimed subject matter except a plurality of write circuits coupled with the plurality of magnetic tunneling junctions and with the reference magnetic tunneling junction. However, Naji (6055178) discloses a plurality of write circuits (fig. 4, 68, 69) coupled with the plurality of magnetic tunneling junctions (fig. 4, 41, 42) and with the reference magnetic tunneling junction (fig. 4, 70) (col. 4, line 20-22) use for programming the magnetic tunneling junctions. It is common knowledge that pluralities of memory cells in an array will requires plurality of writes circuits. Therefore, it is obvious for one having an ordinary skill in the art at the time the invention was made to incorporate the plurality of write circuits of Naji's (6055178) into Naji's (611781) to use in the write operation of the array of magnetic memory cells.

Allowable Subject Matter

6. Claim 9 and 10 are objected as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not show the limitation of said control circuit includes a plurality of magnetic tunneling junctions includes six magnetic tunneling, capable of storing eight bits. Prior art also does not show the control circuit includes a plurality of magnetic tunneling junctions includes eleven magnetic tunneling junctions, capable of storing sixteen bits.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. Zhu et al (5734605) disclose a magnetic tunneling junction memory cells.
8. When responding to the office action, Applicants' are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.
9. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see MPEP 710.02 (b)).
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to whose telephone number is (703) 306-5731. The examiner can normally be reached on Mon. - Fri. from 8:00 A.M. to 5:30 PM. The examiner's supervisor, David Nelms, can be reached on (703) 308-4910. The fax phone number for this Group is (703) 308-7722. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-0956.

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C. Yoha

October 5, 2002



Connie C. Yoha

PATENT EXAMINER

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